

## Multisensory Approaches to Enhancing Students' Readiness for Special Education Learning Disabilities

Enfoques multisensoriales para mejorar la preparación de los estudiantes para discapacidades de aprendizaje de educación especial

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### ABSTRACT

A multisensory approach is a necessary component of special education learning that can enhance children's sensory capabilities such as vision (visual), auditory (hearing), kinaesthetic (movement) and textile (touch) to focus more on learning. The purpose of this study was to see how effective the multisensory approach in Special Education Learning Disabilities is to students with learning problems' willingness involving cognitive, physical, emotional and social domains to help them learn in the classroom during the learning and teaching process. The researcher used qualitative methods using observation, document analysis and structured interview protocols as instruments in this study. The results show that the multisensory approach can accelerate the thinking process and enhance the learning readiness of special education students especially for autism students. Implications and suggestions, the researchers suggest that further studies may be conducted on students with different disabilities such as special education students with visual impairments, special education students with hearing problems, pre-school and mainstream students.

**Keywords:** multisensory, visual, auditory, kinesthetic, tactile, qualitative, learning disabilities, autism.

### RESUMEN

Un enfoque multisensorial es un componente necesario del aprendizaje en educación especial que puede mejorar las capacidades sensoriales de los niños, como la visión (visual), auditiva (auditiva), cinestésica (movimiento) y textil (tacto) para enfocarse más en el aprendizaje. El propósito de este estudio fue ver cuán efectivo es el enfoque multisensorial en las Discapacidades de Aprendizaje de Educación Especial para los estudiantes con problemas de aprendizaje y su disposición que involucra dominios cognitivos, físicos, emocionales y sociales para ayudarlos a aprender en el aula durante el proceso de aprendizaje y enseñanza. El investigador utilizó métodos cualitativos utilizando la observación, el análisis de documentos y los protocolos de entrevistas estructuradas como instrumentos en este estudio. Los resultados muestran que el enfoque multisensorial puede acelerar el proceso de pensamiento y mejorar la preparación para el aprendizaje de los estudiantes de educación especial, especialmente para los estudiantes de autismo. Implicaciones y sugerencias, los investigadores sugieren que se puedan realizar más estudios en estudiantes con diferentes discapacidades, como estudiantes de educación especial con discapacidad visual, estudiantes de educación especial con problemas de audición, estudiantes de preescolar y de educación general.

**Palabras clave:** multisensorial, visual, auditiva, kinestésica, táctil, cualitativa, discapacidades de aprendizaje, autismo.

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## 1. INTRODUCTION

According to the statistics released by the Social Welfare Department until March 31, 2017, the state of Selangor registered the highest number of disabled people with Special Education Learning (146,809 people) compared to other states. As such, schools in Selangor which have large numbers of pupils in the Special Education Learning program have caused a variety of behaviours, tantrums and lack of focus, which is a challenge for teachers in addressing these problem areas that could interfere with their students' learning readiness. In this regard, several schools of Special Education Learning in Selangor are exposed to a multisensory approach through sensory parks through five basic stimuli which include vision, hearing, touch, smell and taste to enhance student readiness and focus.

In opinion of domestic studies such as Manisah and Norizza (2016), students with learning disabilities are also at risk in terms of understanding and storing information because of their poor focus. Overseas studies such as Dogru's (2014) study suggest that this problem also affects learning skills including teaching and learning processes as well as frequent mistakes in school and homework. This is one of the factors that make students' readiness level of learning very limited.

Next, there have been some studies that multisensory approaches through sensory gardens can enhance stimulus sensitivity such as touch, visual, auditory, kinesthetic and tactile. For example, a study by Pauline (2013) states that outside classroom learning is more important than reading a book. Children learn through a variety of activities and experiences. This is because multisensory through the sensory garden can be a place to stimulate the basic senses and learn other subjects. Similarly, a study by Linda Balode (2013) stated that many multisensory through the park provides sensory and therapeutic garden aesthetics to enhance all five of the human senses - vision, touch, smell, taste and hearing. Hazreena Hussein's (2014) study, however, explores that playing outside promotes sensory stimulation, physical mobility and social skills among children with special needs. A multisensory approach to helping children with sensory processing problems tend to have extreme reactions to sensory stimulation whether stimulated too much or too little.

The multisensory sensory approach in teaching is a learning process that utilizes visual sensory (vision), auditory (hearing) and kinaesthetic-textile (movement, textile) to enhance memory and learning process. According to Delaney (2010), the sensory systems in the human body such as, vestibular (movement-balance), proprioceptive (muscle-motor), visual (vision), auditory (hearing), tactile (touch), gustatory (observation) and olfactory (smell) can stimulate all these senses through the sensory garden. Therefore, the multisensory approach through the sensory garden stimulates the five senses of the human being to be more sensitive (Sensory Trust, 2013; Worden and Moore, 2013). This finding is also supported by Sibermann (2010) who stated that multisensory use is excellent because it supports each other in the weaker sensory parts.

### 1.1 Model VAKT

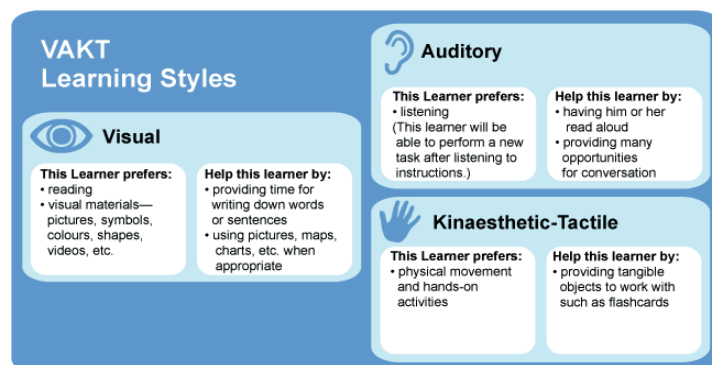


Figure 1: Model VAKT (Visual, Auditory, Kinesthetic dan Tactile)

(Adapted from Model VAKT, Neil Fleming, 1987)

This study uses VAKT Model (Visual, Audio, Kinaesthetic and Textile) introduced by Neil D. Fleming who was a teacher from New Zealand in 1987. Not only he introduced the VAKT model in the learning process but also introduced the VARK model (*visual, auditory, reading and writing, kinesthetic*).

Based on the VAKT (Visual, Audio, Kinaesthetic and Textile) model it is suitable for researchers in the sensory garden using 5 multisensory senses namely vision, hearing, touch, smell and taste. For example, the Putnam L. R 1996 study used VAKT (visual, audio, kinaesthetic and textile) models as multi-sensory learning potentially enhancing memory and language learning. This VAKT model focuses on three aspects: visual (what is seen), audio (what is heard) and kinaesthetic-textile (movement, taste, touch) that are factors in impacting learning outcomes.

Next, the Ayoob Barbar (2018) study also used the VAKT model in multisensory learning involving two or more senses with similar activities. This multisensory approach is also known as VAKT (Visual, Audio, Kinesthetic and Textile) where students learn when information is conveyed in different modalities. Students with learning difficulties often experience difficulty in one or more areas of reading, spelling, writing, listening comprehension and expressive language. Multisensory techniques allow students to use any of the above areas to help them prepare for learning. According to Ayob Barbar (2018), the following are the senses that we can learn or remember that are 20% reading, 30% listening, 40% watching, 50% talking, 60% treatment and 90% (see, hear, talk and do).

According to Jeyasekaran (2015) study examined visual, auditory, kinesthetic and textile (VAKT) effectiveness among

children with reading disorders at the Helikx Open School and Learning Centre, India. Thirty subjects were selected using purposive sampling technique. The combination of VAKT Techniques and Word Schonell Reading Test was used in the study where the 30-day period was followed by a post-reading assessment. The results show that the mean percentage reading level increased by 12% after incorporation and there were statistically significant differences before and after the intervention at the  $p < 0.05$  level. This indicates that the VAKT technique is effective in improving reading levels among dyslexic children.

For the study of Mehrabi et al. (2014), studied the effect of multisensory teaching methods using Sina educational instruments to measure the reading and writing levels of children with learning disabilities in the city of Tonekabon, Iran. A study sample of 30 randomly selected students with reading and writing disabilities. They are divided into two groups namely experimental and control groups. To collect data, students with reading dysfunction (NAME), test (spelling) and Wechsler Intelligence for Children (WISC-R) Scales were used. The experimental group participated in 45 weeks of structured training for 13 weeks. The results show that Sina's multisensory teaching methods can improve the reading and writing of children with learning disabilities.

Besides that, Nourbakhsh (2014) studied the effect of multisensory and cognitive methods on interventions training on the reading ability of dyslexic students in Iran. The study sample of 60 dyslexic students was divided into three experimental groups with 20 dyslexic students in the first experimental group (E1), 20 dyslexic students in the second experimental group (E2) and 20 dyslexic students in the control group (C). The researcher took 16 weeks to teach reading and test, the Gestalt Visual-Motor Bender Test, and the Rorschach test. Findings indicate that both groups (E1 and E2) improved from pre-intervention. However, both groups significantly improved their perceptual performance in reading and dyslexia tests.

Therefore, researchers apply this model to the learning process of students with learning problems through exposure to the Sensory Garden environment to enhance their learning readiness as an educational process.

## MULTISENSORY

### 1.1.1 Visual

Through the eyes the child can see what is them playing so that they can feels the experience (Hughes 2001). Elements such as colour, visual texture, shape, movement, light and shadows are essential to stimulate students' visual senses. Colour provides visual stimulation as well as balances elements in the sensory garden that can attract students' attention to the variety of colours available so that students are excited with the colours. As such, important visual sensory stimulation is taken into account as multisensory through colourful plant and flowers, foliage and tree trunks can enhance the visual appeal of the garden.

### 1.1.2 Auditory

Listening to the sounds of the garden can enhance the hearing. Examples include breeze, bird chirping, squirrel sounds can enhance the stimulation of hearing. With this, the bird's nest can also be hanged in the trees to make the sensory garden look attractive with various elements. Likewise, fountains, harp and pools can soothe the surroundings of the garden. In addition, sounds can also influence children especially in the emotions they feel (Day 2007). In opinion of Broto (2010), sensory experiences such as friction between thatch and bamboo stalks enhance children's curiosity to seek the direction of the sound.

### 1.1.3 Kinesthetic

The kinesthetic sense is movement. It is the ability to process and make meaning of an environment or perception using fine and gross motor skills (Block, 2015). In aschool setting, kinesthetic engagement involves students' physical actions used to create something of meaning. This may look like students acting upon a task or physically completing an assignment.

### 1.1.4 Tactile

According to Bergstrom (1995) touch experiences provide more stimulation than visual sensation for children. Materials such as stone, wood and clay provide more stimulation of textiles than industrial products such as plastics, concrete, MDF wood and so on although they are more visually appealing (Day 2007). According to Masiulanis and Cummins (2017), outdoor areas can be divided into pavement (concrete and stone), small areas (rubber, sand and pebbles) and garden areas (grass, shrubs and other plants). These elements stimulate the children's sense of touch in the garden. Broto (2010) stated that differences in the garden area based on its texture can provide information about the differences in space and provide children with play elements.

## 1.2 Research questions

The questions raised in this study are:

1.2.1 What are the levels of readiness and concentration for student with learning disabilities?

1.2.2 How are multisensory activities carried out in the sensory garden?

## 2. METHODOLOGY

This study uses qualitative methods to determine the effectiveness of multisensory approaches through the sensory garden on the level of student learning preparedness and focus during the teaching and learning process for students with special learning needs. The researcher uses observation (written record, video and image), document analysis (workbook results) and structured interview protocols as instruments. The Pre-test was conducted into two group.

They are control group and treatment group that consists of 9 respondents. Subsequently, the Post Examination was conducted after a period of 2 weeks to 9 respondents in the treatment group. The Pre-test and Post-test questions given by the respondents are the same. Data collection is based on the score difference obtained during the Pre and Post Examinations.

According to Creswell (2003) stated that research is the exploration of a unit or system through data collection and data analysis using various methods. The use of various sources of data collection method is known as triangulation (Bogdan & Biklen 2007; Robson 2002). Triangulation is a strategy that reduces the risk of bias against a single data source (Maxwell 2005).

In that regard, the researcher used structured observations and interview protocols as instruments in this study. The checklist instruments for the observations and sets of interviews were reviewed and validated by two specialists in the special education field of higher education institutions. The researcher developed the field notes form based on the fetterman's (1989) description of the classroom observation form used when studying dropout students. Further, the researchers collected observation data, checklists and recordings using video recorders to further strengthen observation data (Miles et al. 2014).

Researchers self-administer interview guides that contain structured semi-structured interview questions in line with Stewart and Cash's (2000) opinion that before beginning a research topic, the researcher should develop an interview guide or question. According to Denzin (2001), interviews should be used more than once as a tool for information collection, interviews need to be reflective and can reflect the categorization of three semi-structured and non-structured interviews (Chua Yan, 2006) of the life and circumstances of a phenomenon: type interview namely structured interviews (Piaw, 2014). The data were analysed using descriptive statistics for frequency, percentage and mean to see how effective the multisensory approach to readiness and interest in learning can be in the social, cognitive, communication and psychomotor aspects of students.

Table 1: Background of Student Learning Disabilities

Interview code	Category	Gender
S_1	Autisme	L
S_2	Cerebral Palsy	L
S_3	Dyslexia	P
S_4	Dyslexia	L
S_5	Syndrom Down	L
S_6	ADHD (Attention Deficit Hyperactive Disorder)	L
S_7	ADHD (Attention Deficit Hyperactive Disorder)	L
S_8	Slow Learner	P
S_9	Slow Learner	L

#### Code S – Research Sample

The special education students involved in this study were 9 people from class 5 Aman and they are in treatment group. There were 1 autism student, 1 cerebral palsy, 2 people with dyslexia, 1 down syndrome, 2 ADHD and 2 people that are slow learner. Students from this class consist of 2 girls and 7 boys. A Science subject teacher was also involved as the respondents of this study.

### 3. RESULT AND DISCUSSION

#### 3.1 Pre Test

Pre-tests were conducted on the sample of the two treatment groups and the control group in this study. The following is the data of the study sample achievement in the pre-test.

Table 2. Achievement of Study Samples in Pre Test

Group	Sample	Score	PercentageRating	Rating	Grade/ Level
Treatment Group	F	6/15	40%	Fair	D
	G	5/15	33%	Poor	E
	H	7/15	47%	Fair	D
	I	6/15	40%	Fair	D
	J	5/15	33%	Poor	E
	K	7/15	47%	Fair	D
	L	10/15	67%	Good	B
	M	8/15	53%	Good	C
	N	4/15	27%	Poor	E
Control Group	O	7/15	47%	Good	D
	P	6/15	40%	Poor	E
	Q	5/15	33%	Poor	E
	R	9/15	60%	Good	B
	S	10/15	67%	Good	B
	T	7/15	47%	Fair	D
	U	8/15	53%	Good	C
	V	6/15	40%	Fair	D
	W	8/15	53%	Good	C

Table 2 above shows the data of the study sample results for the treatment and control groups in the Pre-Test. The highest score recorded for the treatment group was Sample L with 67% (Honors) while the lowest was Sample N with

27% (Minimum). The differences of highest and lowest scores for the treatment group were 40%. Next, in the control group, the highest score was Sample S with 67% (Honors) and lowest was Sample Q with 33% (Minimum). The range between the highest and lowest scores for this control group was 34%.

### 3.2 Post-test

The implementation of post-test is one of the data collections conducted on the study sample. For the treatment group even during the 2-week treatment period conducted on the study sample in the control group, the study still used conventional methods. The treatment group received guidance in learning in the Sensory Garden through a multi-sensory stimulus for the core subject that is Science related to the Learning Content Standards for 2 weeks in stages.

Based on the following Table 3 it is seen that the performance of the Treatment Group in the Post-test was better than the Control Group. This is because based on the number of achievements shown, the sample is at three times higher satisfaction level than the control group. The treatment group had the highest score of 14 with 93% while the lowest recorded 8 points with 53%. Comparison of the highest and lowest scores for the intervention group was 40%. For the control group, the highest score was 10 marks with 67% and the lowest was 5 marks with 33%. It can be seen that the comparison between the highest and lowest scores for this group is 34%.

Table 3 Achievement of Study Samples in Post-Examination

Group	Sample	Score	PercentageRating	Rating	Grade/ Level
Treatment Group 9/9 stdents	F	12/15	80%	Very Good	B
	G	9/15	60%	Good	C
	H	10/15	67%	Very Good	B
	I	12/15	80%	Very Good	B
	J	9/15	60%	Good	C
	K	11/15	73%	Very Good	B
	L	14/15	93%	Excellent	A
	M	13/15	87%	Excellent	A
	N	8/15	53%	Good	C
Control Group 9/9 studnts	O	8/15	53%	Good	C
	P	6/15	40%	Poor	E
	Q	5/15	33%	Poor	E
	R	9/15	60%	Good	B
	S	10/15	67%	Good	B
	T	7/15	47%	Fair	D
	U	8/15	53%	Good	C
	V	6/15	40%	Fair	D
	W	8/15	53%	Good	C

It is noted that there were two samples from the Treatment Group that achieved an Excellent rating during the Post-Examination. The number of samples at the Honors level for the intervention group was four times greater than the control group with only two samples.

### 3.3 Comparison of Achievements in Post-Tests

The table below is a data comparison of the sample achievement in the Pre and Post-Examination as shown in Table 2. The differences noted indicate the total increase in test scores after the treatment process. The sample showed the highest differences is sample F and I from the treatment group by 40% while the lowest in the treatment group was sample H.

Table 4 Comparison of Sample Achievement in the Pre and Post-Test

Sample	Pre Test (%)	Post-Test (%)	Difference (%)
F	40	80	40
G	33	60	27
H	47	67	30
I	40	80	40
J	33	60	27
K	47	73	26
L	67	93	26
M	53	87	34
N	27	53	26



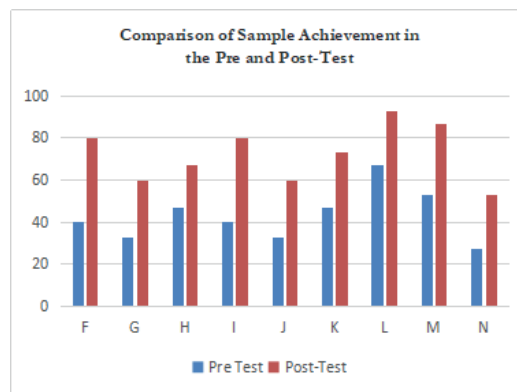


Figure 2 Comparison Graph of Pre and Post Tests

Comparison of achievement differences between study samples was done as in Figure 3 above. Sample L recorded the highest score compared to the other samples followed by sample M with the second highest. Samples F and I were in third place with a same total test value of 80%. Then in fourth place is sample K, followed by the fifth-place sample H. For sample G and Sample J they got the same test volume (jumlah), that was 60% and in sixth place. Finally, the sample N recorded the lowest but showed a good improvement. Nine of these samples were samples from the treatment group.

### 3.4 Level of readiness and learning focus

Based on the data collection method, the researcher found that all the data obtained supports each other. The results obtained show that all respondents achieved an increase in student learning readiness after the study period was completed. The results obtained were positive and it gives a great impact and effective to the respondents. Students' focus on learning is also more focused and sensitive to learning activities. Students are more prepared before learning and excited about activities that are conducted in or out of the classroom.

The concept of learning readiness refers to three main domains that are cognitive, emotional and social domains that aid a student's learning process. Without this readiness to learn, the learning objectives that the teacher is aiming for cannot be achieved. Therefore, preparing students for learning is important and is a key element that teachers need to emphasize in order for learning to work effectively and to achieve its goals. Willingness to learn is one situation that enables one to learn. As they learn, their interest in learning will increase.

### 3.5 How to implement multisensory activities carried out in sensory gardens

This finding shows that the manner in which activities carried out in the Sensory Park has a positive impact on all students of special education in 5 Aman class learning. If students have been studying in the classroom before and many problems have arisen such as boredom, discomfort, misunderstanding and loss of attention but after careful exercise in the sensory garden, many positive effects can be seen.

Multisensory learning activities in the sensory garden that have been implemented through multisensory stimulation not only have a positive impact on students' level of readiness and focus but socialization and communication skills also have a positive impact on students. According to Baker J.E (2010) social skills are focused on enhancing social interactions with peers. Her research uses peers to help children with autism improve social skills through playing. Therefore, the development of socialization, cooperation and friendship are indirect aspects of social skills. Therefore, it is recommended that teachers use a multisensory approach in the sensory garden to improve the communication skills of students with speech, reserved and emotional problems.

In this regard, a dedicated teacher needs to be aware of their role in shaping and transforming students' learning problems in improving students' readiness and focus. In addition, teachers can also enhance their knowledge to ensure that the quality of teaching and learning in and outside the classroom is enhanced in a more effective way. Mohamad Jackie et. al (2016) stated that quality teaching encompasses a variety of teaching methods using the latest and applying hands-on teaching methods. Therefore, a multisensory approach through the sensory garden can benefit students' and teachers' learning and teaching.

### 3.6 Discussion

Ross R.H et al. (2011) states that learning through playing is a well-planned and structured approach that gives students the opportunity to learn in a fun and engaging environment. The approach to learning through play in the sensory garden emphasized the process of teaching and learning as playing is a is what children do.

The researchers suggest that further studies may be extended to such subjects such as special education students with visual impairments, special education students with hearing problems, pre-school students and mainstream students. Because multisensory stimulation is appropriate for all children to achieve meaningful learning. Research on other research subjects will be able to prove whether this study is effective in the field of education as a whole.

Besides that, teacher suggestions can diversify the multisensory activities of the sensory garden through play, exploration, project and hands-on activities. Outside of classroom learning not only allows students to explore the environment but these various activities can enhance the development of their self-esteem and make the learning problem enjoyable for the students. This statement is supported by Summer L. Esseff (2016) explaining that these small successes will lead

them to readiness to try new things and hopefully lead them to a more independent life and participate in many other activities.

In this regard, researchers recommend that all special education schools throughout the country have a sensory garden as a multisensory approach within the PdP that can help teachers improve their students' learning readiness. In fact, the design of beautiful, organized and safe sensory parks should be undertaken by the school authorities. Even the Ministry of Education Malaysia should give allocation and goes to the sensory garden to take a look at the sensory garden's needs. Art elements such as textures, pathways, reflexology sites, colours, herbs and so on are needed to bring the atmosphere of the garden environment to the attention and interest of all students.

In short, this study should be a practical exercise in schools to ensure that the education system can be improved in a better way. This study is not only used as a study material but also to be applied by teachers in PdP if it is found to have a positive impact on student achievement. In this regard, the education system can be enhanced in a more optimistic way. Furthermore, the Malaysia Ministry of Education can produce a Sensory Park implementation module for all special education students in schools across the country on the importance of learning in Sensory Park to improve the level of student learning.

In conclusion, this proposal is expected to have a positive impact on improving the level of student learning preparedness of learning problems that can be applied in schools across the country.

#### 4. CONCLUSION

Students Learning Disabilities in a variety of categories often tends to have the emotional, behavioural, developmental and communication problems that make it difficult for them to learn. Thus, these special education students need a more enjoyable learning environment to achieve their learning objectives. These include to attract their attention, teachers need to introduce effective learning and teaching methods through strategies, using technology, rewarding students for good performance as a motivating factor and when they reach low grades, they often tend to work more to make improvements (Nyagosa, 2011).

As such, the multisensory approach in the sensory garden is one of the ways to increase the readiness, interest and focus of students with learning disabilities. In conclusion, the willingness to learn and the interest of special education students are inconsistent and sometimes good or bad. As a teacher, they need to be aware of how to increase the children's readiness and interest in learning while also improving in other aspects such as social, cognitive and psychomotor. Therefore, teachers need to have the knowledge and variety of techniques and learning methods that suit the diverse abilities and abilities of students.

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